Article

The influence of force plate striking on lower extremity kinematics during sprinting

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Journal of Sports Sciences, 2015
Vol. 33, Supplement 1, s1–s4, http://dx.doi.org/10.1080/02640414.2015.1110318

Routledge
Taylor & Francis Group

ABSTRACT

Day 1. Posters – biomechanics and motor behaviour

030. The influence of force plate striking on lower extremity kinematics during sprinting

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The analysis of kinetics and kinematics in a laboratory setting generally requires the participants to make foot contact with an embedded force plate. Natural running/sprinting gait may be altered to ensure contact with the device, such deliberate striking is known as targeting (Challis, 2001, *Journal of Applied Physiology*, 17, 77–83). When participants adjust their gait to target the force plate, the resulting data may be compromised (Sinclair, Hobbs, Taylor, Currigan, and Greenhalgh, 2014, *Journal of Applied Biomechanics*, 30, 166–172). To the researcher's knowledge, no studies have investigated how sprinting across a force plate may affect the kinematics of the lower extremities. The aim of the current investigation was to examine the influence of force plate targeting on three-dimensional kinematics of the lower extremities and participants' subjective perceptions during sprinting. *With institutional ethical approval, 13 participants (10 males and 3 females) (age: 26.2 ± 3.8 years; mass: 76.5 ± 8.9 kg; stature: 174.8 ± 8.2 cm) (mean ± SD) volunteered to take part in this investigation. Participants sprinted 6 m in two conditions: (1) over an embedded force plate and (2) uninhibited to the side of the force plate without concern for striking it. Stance phase three-dimensional kinematic parameters (hip, knee and ankle) were extracted for analysis; angle at foot-strike, angle at toe-off, peak angle during stance, range of motion (foot-strike to toe-off during stance) and the relative range of motion (the angular displacement from foot-strike to peak angle). After the testing session, the participants were asked to rate their subjective comfort in each condition (10-point Likert scale). The results indicated a number of significant kinematic differences at the hip and knee joints in the sagittal, coronal and transverse planes ($P < 0.05$). Interestingly, the force plate striking condition led to reduced hip and knee flexion at foot-strike ($P < 0.05$) as well as significantly lower peak flexion ($P < 0.05$). Lower extremity alterations of this nature are associated with a reduced stride length (Sinclair, Richards, Taylor, Edmundson, Brooks, and Hobbs, 2013, *Sports Biomechanics*, 12, 272–282). Force plate targeting had less impact on the ankle joint, at which only the sagittal plane range of motion was significantly different between conditions ($P = 0.045$). The subjective responses revealed that participants felt more comfortable during the normal sprint condition compared to the force plate striking condition ($P = 0.014$). In conclusion, it is recommended that researcher's undertaking similar testing procedures interpret the results with caution. Further research is necessary to investigate the impact of additional coaching cues on targeting when sprinting across a force plate.

031. A comparison of lower limb injury risk factors between males and females

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Females are 2–10 times more likely to suffer an anterior cruciate ligament (ACL) tear than their male counterparts (Russell *et al.*, 2005, *Journal of Athletic Training*, 41, 166–171). Despite the apparent gender difference in injury occurrence, ambiguity still exists regarding the underlying mechanisms, with most studies investigating only one or two potential factors. Hence, the purpose of this study was to investigate the effects of gender on a host of lower limb injury risk factors. Following institutional ethical approval, six male (21.0 ± 3.16 years, 181.4 ± 3.79 cm, 91.0 ± 5.44 kg) and six female (20.33 ± 0.82 years, 166.18 ± 6.61 cm, 68.02 ± 4.61 kg) (mean ± SD) participants completed two testing sessions separated by at least 48 h. During visit one, the participants